

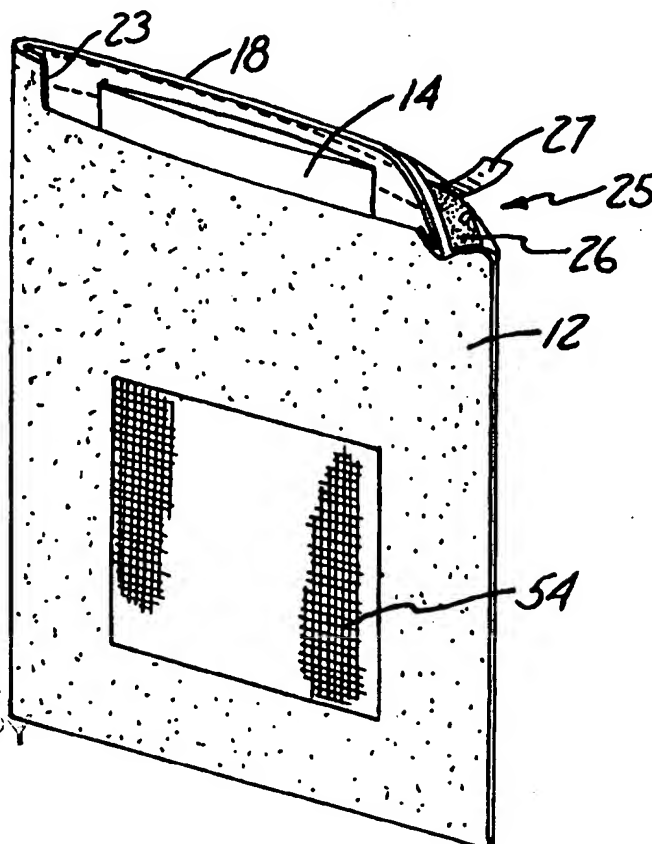


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(54) Title: CLEAN UP DEVICE WITH CLOSURES**(57) Abstract**

The invention relates to a clean up bag (10) and more particularly to a plastic bag (12) having a plastic glove (14) heat sealed to one interior side. The glove (14) has two thumbs (16) so that it may be used by either left handed or right handed individuals. Several bag embodiments are set forth. One embodiment of the bag is covered, on one side or entirely, with a cut-resistant fabric (50) and further has a padding (54) of fibrous material to absorb any liquid in the waste. Other bag embodiments do not utilize a cut-resistant layer. The bag has a plurality of closure structures positioned on the top and which permits the bag to be turned inside-out and closed, thereby having the waste inside for subsequent disposal.



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CLEAN UP DEVICE WITH CLOSURES**SPECIFICATION****BACKGROUND OF THE INVENTION**

5 This invention relates to clean up devices and methods, and more particularly to a device and method for cleaning up hazardous, infectious or toxic wastes. More particularly, this invention relates to clean up devices having various closure structures and their respective methods of use.

U.S. Patent No. 4,964,188 to Olson, entitled "Clean Up Device", (the entire disclosure of which is hereby incorporated herein by reference) discloses a
10 clean up device which includes a glove which is heat-sealed to the inside of a plastic bag. The plastic bag is used to pick up waste, and in particular animal excrement. The clean up device permits the excrement to be easily picked up and disposed of. The glove prevents the bag from slipping around on the hand. Further, the outside of the bag has padded material mounted to the surface of the
15 bag. This padding material absorbs any moisture contained in the excrement so that the excrement does not slip when the user is picking it up. Further, the padding serves as an insulator so that the user does not feel the texture or heat of the excrement.

U.S. Patent No. 5,301,806, also to Olson, entitled "Clean Up Device
20 With Cut Resistant Layer", (the entire disclosure of which is also hereby incorporated herein by reference), discloses a plastic clean up bag that has a plastic glove which is heat sealed to one interior side of the bag. The glove has two thumbs so that it may be easily used by either left handed or right handed individuals. The bag is further provided with a cut-resistant fabric and has a
25 padding of fibrous material on the outside of the bag which absorbs any liquid surrounding or contained in the waste to be picked up. The bag also has a draw string closure on the top and which may be pulled from either side. The bag is

turned inside out once the waste has been cleaned up, and the draw strings are used to close the bag for disposal purposes.

The present invention is a further development of the devices disclosed in these Olson '188 and '806 Patents. The invention is particularly adapted for cleaning up hazardous, infectious or toxic wastes and, particularly, discloses further absorbent materials that may be incorporated into the device structures. Further, additional closing structures are taught which may be used with the devices of the Olson '188 and '806 Patents to close the respective bags for disposal.

SUMMARY OF THE INVENTION

The invention relates to clean up devices and more particularly to a plastic bag that has a plastic glove which is heat-sealed to one interior side of the bag. The plastic bag is surrounded by a layer of cut-resistant material such as Kevlar™. There is an absorbent towel attached to the outside of the cut-resistant layer which absorbs any liquid surrounding or contained in the waste to be picked up. The bag also utilizes various closure structures. Optionally, the bag is opaque so that the contents are not visible.

According to another embodiment of the invention, a gauze pad or other such absorbent pad is attached to one side of the bag and superimposed on the absorbent towel layer, to provide additional absorbency. This pad, or the absorbent towel layer, may be impregnated, soaked or covered with a disinfectant for medical applications of the bag, or it may be impregnated with a cleaning material, such as a solvent, when the bag is used to clean toxic waste. Also, the pad may be adapted for special functions, such as for scrubbing a surface, as well as for industrial clean-up functions.

In use, the user places his or her hand inside the plastic glove which is inside the bag and subsequently grasps or wipes up the waste. The padding absorbs the moisture or waste, while the cut-resistant material prevents needles, broken glass or the like from puncturing through the plastic and, thus, protects the user's hand. The user subsequently turns the bag inside out so that the waste is contained inside the bag. Finally, the closure mechanisms are used to close the bag. The user may carry the waste, which is neatly contained within the bag, or the user may dispose of the bag containing the waste at the first convenient or designated location.

These and other benefits of this invention will become clear from the following description by reference to the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a schematic view of the clean up bag constructed in accordance with the teachings of the present invention;

Figure 2 is a schematic view of the clean up bag of FIG. 1, being turned inside out;

Figure 3 is a cross-sectional view of the top of the clean up bag of FIG. 1;

Figure 4 is a schematic view of the clean up bag after it has been turned inside out;

Figure 5 is a schematic view of an alternate embodiment of the clean up bag according to the present invention;

Figure 6 is a cross-sectional view of the top of the clean up bag of FIG. 5;

Figure 7 is a schematic view of an alternate embodiment of the clean up bag according to the invention and showing an alternate closing structure;

Figure 8 is a schematic view of another embodiment of the clean up bag according to the invention;

Figure 9 is a schematic view of another embodiment of the clean up bag according to the invention;

Figure 10 is a schematic view of another embodiment of the clean up bag of the invention;

5 Figure 11 is a schematic view of another embodiment of the clean up bag according to the invention;

Figure 12 is a plan view of another embodiment of the clean up bag according to the invention;

10 Figure 13 is a schematic view of an another embodiment of the clean up bag according to the invention;

Figure 14 shows the process steps of using the clean up bag of the invention;

Figures 15 and 16 are plan views showing the printing on the clean up bag of the invention when used for infectious or biohazardous waste; and

15 Figures 17 and 18 are perspective views taken from the top showing alternative embodiments of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to Figure 1, the present invention consists of a clean up device 10 being constructed of a bag portion 12 and a glove portion 14 for use in the clean up and disposing of toxic, hazardous, or infectious waste (not shown).

20 Preferably, the glove 14 is sized and shaped to receive an adult's hand and has two thumbs 16 so that the glove 14 may be used by either left handed or right handed individuals. However, a one-handed glove (i.e. either right or left) will also work well. In the preferred embodiment, the glove 14 is constructed of a heat-sealable plastic material, however, those skilled in the art will readily
25 recognize that other materials may be used within the purview of this invention.

The bag 12 is generally rectangular in shape and sized to receive the glove 14. In the preferred embodiment, the bag 12 is constructed from heat-sealable plastic, similar to that from which the glove 14 is constructed. Preferably, the plastic utilized is opaque so that when the bag is turned inside out, the contents are not visible. Those skilled in the art will appreciate that alternative materials may be used.

The bag 12 has a top 18 and a bottom 20 and two opposite sides 22 and 24. Optionally, the bag 12 may include pleats (not shown), one pleat positioned on each side 22 and 24, and extending longitudinally from the top 18 of the bag 12 to the bottom 20 of the bag 12. Such optional pleats allow the bag 12 to be easily turned inside out so that the waste is easily contained in the interior of the clean up device 10.

Further, the bag 12 is shown to have a gathering type cord arrangement 30 which may be pulled from either side of the bag 12 to secure the contents of the inside of the bag 12.

The gathering arrangement 30, as shown, consists of a first 32 and a second 34 draw string cord. Both draw string cords 32 and 34 are located in a sleeve 36 positioned along the top 18 of the bag 12. The sleeve 36 is formed by folding over a small portion of the bag 12 near the top 18 and heat sealing the folded edge to thereby form the sleeve 36. The draw string cords 32 and 34 are both placed in the sleeve 36 so that the first cord 32 may be drawn closed from side 22 of the bag while the second cord 34 may be drawn closed from side 24 of the bag 12.

As shown in Figure 3, the bag 12 may include a plastic bag 15 which is covered with a cut-resistant material 50, such as Kevlar™. Material 50 is preferably fastened to the plastic bag 15 with an adhesive, and covers the entire outside surface of the plastic bag 15 to prevent puncture of the bag 12 by glass or needles or other sharp objects. Layered over material 50 is an absorbent towel

material 52 (attached by adhesive), which is shown covering the entire surface of material 50 but optionally need only cover selected portions of the material 50, such as the surface of material 50 on the side 38 opposite the inside surface of the bag 15 to which the glove 14 is attached. Towel material 52 is preferably a corrugated cotton fabric which is often used in hospital settings; however, it will be appreciated by those skilled in the art that any type of absorbent material may be used. Towel material 52 is used to absorb any liquid surrounding or contained in the waste.

Optionally, as shown in Figures 5 and 6, a pad 54 is attached by adhesive or stitching to the towel material 52 on side 38 of the bag 12. The pad 54 or other such absorbent pad is preferably gauze for medical applications, and is attached to provide additional absorbency. Preferably, pad 54 may be a 4"X4" or 4"X6" (or larger) surgical gauze positioned into the approximate center of the bag side 38 for added absorbency of open wounds or used in direct surgical procedures where fluids and/or blood needs to be absorbed quickly. Optionally, the gauze 54 (or towel material 52) can be premedicated (substance 56, such as a medication or disinfectant), pre-sterilized, pre-sanitized, etc., and already packaged in that manner, ready to off-set possible infection at the clean-up site when the bag 12 with gauze 54 is applied. In addition, due to the increased absorbency, a disinfectant or sanitizing solution could be applied directly to the gauze insert 54 during use and then applied to the area or open wound for infection control. The absorbent towel layer 52 or pad 54 may be impregnated or soaked or covered with a cleaning material such as a solvent, in the case of use of the bag 12 to clean up a toxic waste. Also, the pad 54 may be adapted for special functions such as for scrubbing a surface containing a toxic, hazardous or infectious waste.

The clean up device 10 is preferably constructed by heat sealing the plastic glove 14 to one interior side 42 of the bag 12. In operation, the user places his or her hand inside the plastic glove 14 which is located on the inside 42 of the plastic

bag 12. The user then grasps the inside of the bag 12 and uses the glove 14 to control the movement of the outside surface of the bag 12 for cleaning, or to grasp objects such as sharp materials or other hazardous or infectious objects to be disposed of. The device 10 may be used to clean up liquids, blood, mucus, sinews, body parts, feces and other various spilled substances required to be cleaned up in and around a hospital, nursing home, clinic, day care, home care/nursing or used in any medical emergency situation. The paper toweling material 52 is optionally strong enough to permit it to be moistened first and applied to the area(s) for intended clean-up, if desired. Soap, disinfectants, sterilizing solutions can be applied to the paper toweling material 52 and/or pad 54 first for easier clean up or, it can be used in a dry format, for easy absorbency. The towel material 52 and/or gauze 54 absorbs moisture and, thus, aids in gripping objects and allows for spills or blood to be cleaned up. Further, the padding 40 prevents the user from feeling the texture and heat content of the waste, if such is present. Optionally, a pad 54 or the towel material 52 may be of a heat resistant material to allow for the handling of hot objects or like materials.

After the user has picked up or wiped up the waste, the user may use the other hand to turn the plastic bag 12 inside out (Figure 4). When the bag 12 is turned inside out, the user can then remove his or her hand from the plastic glove 14 and grasp both ends of the draw strings 32 and 34 and tighten them to close the bag 12. Thus, when complete, the waste is contained in the interior of the bag 12. The present invention thus has applications in medical, industrial and household cleaning areas. While it is contemplated that the invention is best used as a disposable product, in some cases the bag 12 and paper toweling material 52 may be rinsed out, hung to dry, and re-used several times. As another alternative, the bag 12 can have a layer of linen or cotton absorbent material instead of the paper toweling material 52 and, thus, may be re-used repeatedly until the plastic bag 12

starts to show signs of wear, at which time, it may be turned inside out and permanently discarded.

Figure 7 shows an adhesive closure structure 25 positioned along the top 18 of the bag 12. The closure 25 is comprised of a strip of double-backed adhesive or tape 26 that is shown mounted or affixed to the original exterior side at the top 18 of the bag 12. Optionally, a strip of adhesive may be directly applied to the top of the bag. When the bag 12 is turned inside-out, the protective strip or release liner 27 on the tape 26 is readily available to be removed so that the top 18 of the bag 12 can be turned or rolled over once and sealed with the exposed adhesive surface 26. The corners of the bag 12 are die-cut in such a way that a right angle is provided at each edge 23. The right angles provide added protection from leakage when the strip of adhesive 26 is applied with the proper pressure-sensitive procedure at the time of closing. Utilizing this adhesive closure structure 25 and with proper and careful sealing, a leak resistant closure is provided for the bags of this invention. However, as known, certain caveats relating to the use of the bag 12 for infectious, toxic, or contaminated wastes always remain.

Figure 8 shows a Ziploc[®] type closure 28 wherein an elongated channel 29 is provided on one side of the bag top 18 and a cooperating elongated ridge on the opposite bag top. Similarly, a Gripper[®] zipper type closure may be used wherein small teeth, not discernible to the naked eye, interlock along opposing sides of the top 18 of the bag 12 when it is sealed. Closure of the bag 12 is obtained by sealing the opposing sides of the closure structure 28 when pressure is applied between the thumb and forefinger to the respective sides. This pressure between the thumb and forefinger is applied from one end of the top 18 of the bag closure to the other. The Ziploc[®] type closure provides a nearly airtight, moisture tight closure depending upon the contents contained within the bag 12. Although, leakage along the top seam junctures is a possibility, an absorbent material may

be used for wiping up liquids or blood to convert the liquid substance(s) within the bag 12 to a gel or gelatinous state. Leakage may also occur when outside pressure is applied beyond the bag's containment capacity, to thereby burst the bag structure 12. A cut-resistant lining of Kevlar[®], for example, enveloping the entire bag 12, as previously described herein, will reduce the likelihood of bursting.

Figure 9 shows a wire-lined or rigid closure structure 37 for the clean up bag 12 of this invention. This type of closure is shown to have a length of wire 38 coated with either plastic, paper or similar material 39 and which runs along the top 18 of one side of the bag 12. Two such coated wire segments are shown extending beyond the sides of the bag 12. After the bag 12 containing the added contents is rolled down two or three times, the bag 12 may be closed by turning the wires back over the front or back of the bag 12. If necessary, the wire may be folded back again to extend outwards, unrolled and re-opened. The bag 12 shown may be made with an absorbent cloth material and reused until the plastic lining of the bag 12 has lost its vitality as a protective moisture barrier. Another adaptation may be a paper bag that has a plastic coating or a plastic liner on its interior to serve as a moisture barrier in clean up situations, i.e. vomit bags or motion-sickness bags.

Figure 10 shows a sandwich bag type closure 40 used on the bag 12. The closure 40 comprises a fold and tuck type top closure for the clean up bag 12. Once the bag 12 has been used to pick up or wipe up a spill or to clean up a body part, the bag 12 is turned inside-out so that the mitt which was originally heat-sealed to the interior of the bag 12 is now visually apparent to be on the outside of the bag 12. The unpleasant or spilled substance is now contained within the bag 12. A flap 41 or extended piece of plastic bagging material remains on one side of the bag 12. On the opposing side of the bag 12 is a cuff or folded over piece of bagging material 45. For closure of the bag 12 in this closing method, the flap or

extended piece 41 is now tucked inside the bag 12 and the "cuff" 45 if folded over the end of the bag 12. The bag contents are now folded inside the clean up bag 12 for easy disposal of contained liquid materials or substances. This type of closure is designed particularly for waste that is not toxic, infectious, contaminated or caustic to the skin. Even with an absorbent layer of moisture-activated gelatinous material or lining, for example, the possibility of bag leakage may still be present. The sandwich bag or fold and tuck top type closure 40, as shown, however, is adequate for many innocuous or harmless types of spills in the home, for example.

Figure 11 shows a bag having a loop and hook structure or Velcro® type closure 43 wherein cooperating strips of Velcro® 44 are mounted or affixed to the top 18 of the original interior and exterior sides, respectively, of the bag 12. When the bag 12 is subsequently turned inside-out, the top 18 of the bag 12 may be turned or rolled over once and fastened with the cooperating Velcro® type closure. The corners of the bag 12 are shown die-cut in such a way that a right angle is provided at each edge. The right angles provide added protection from leakage when the strip of Velcro® is fastened with the proper pressure-sensitive procedure at the time of closing. With the loop and hook or Velcro® type closure 43 and with proper and careful sealing, a leak-resistant closure is realized. However, as mentioned above, certain caveats always exist when using a bag 12 for infectious, toxic, or contaminated wastes.

Referring to **Figure 12**, an alternate bag structure is shown having opposing handles 47 and 48 extending from the top of bag 12 and which may be tied to close the bag 12 after use. Thus, after the bag 12 has been utilized, the opposing handles may be tied to contain the materials placed within the bag 12. The bag structure is preferably constructed of a flexible plastic structure.

Figure 13 shows a bio-wipe bag structure 51 wherein an additional high absorbent pad 53 is attached or fixed to the absorbing side of the bag 12. The thicker pad-like material 53 is similar to the thickness of an incontinence product,

such as the product made by Kimberly-Clark (Depends®). The latter absorbent pad material 53 may be superimposed upon the thinner absorbent layer 54 as described in the above Figures. The purpose of this additional pad 53 is to provide greater ease in grasping the exterior pad from inside the bag 12 once the user's hand is inserted into the interior mitt. The additional pad 53 also provides for better facility in wiping up and absorbing greater spills, saline solution, large amounts of blood, various caustic substances, oil spills, and the like. The bio-wipe bag 51 wherein the additionally attached high absorbent pad 53 is used, for example, is designed for use in certain surgical procedures wherein the bag 12 may be turned inside out for subsequent disposal.

Figure 14 shows the method steps for using the bags described herein. As shown, the bag 12 is initially opened and the hand of the user is inserted. Next, the bag 12 is brought in proximity to the waste 13 to be removed or cleaned up. Next, with the waste material 13 firmly grasped, the bag 12 is turned inside out. Finally, the closure structure is readied for use and the bag 12 is closed for disposal. The method steps shown are generally the same for all of the closure structures shown and described herein.

Figures 15 and 16 show printing and associated symbols 55 and 57 that are preferably placed on a surface of each bag 12 of the present invention. The printing 55 and 57 include the internationally recognized symbols to designate the presence of infectious and hazardous waste materials. The printing 55 is generally used in hospital and medical settings, while printing 57 is generally used in industrial settings.

Figures 17 and 18 show alternate embodiments of the clean up device of the invention. Rather than using an interior glove member as shown and described above, heat sealed mitt areas may be utilized. Figure 17 shows clean up device 45 having a top layer 63 and an absorbent pad 68 attached to the bottom layer 65 of the bag. However, inside the bag, an interior flexible layer 64 being

coextensive with the bag layers, is shown sealed or joined to bag bottom layer 65 at seal lines 66 and 67 to form a mitt area within which the hand of a user may be placed. Seal lines 66 and 67 are converging seal lines which form the mitt area, which may have other forms. Figure 18 shows clean up device 46 having a top bag layer 57 and an absorbent pad 62 attached to the bottom of the bag layer 59. Further, an interior or top mitt layer 58 is shown bonded to bag layer 59 to form a diamond shaped mitt as defined by seal lines 60 and 61. The seal lines may be heat sealed areas, adhesive lines, or the like, depending upon the material used to form the mitt area. In summary, the mitt areas described may be utilized in any embodiment of the present invention rather than using of a separate glove member.

Various further alternate embodiments of the present invention are possible, as mentioned above, and they include as follows:

- 1) The interior plastic bag and associated closures, such as the draw-string, may be colored in red to indicate toxic waste.
- 2) The entire "exterior" of the bag with toweling material, cut resistant fabric/material may be manufactured in white or blue colors to indicate use in a surgical/hospital/ medical environment. The interior plastic bag which subsequently becomes the exterior, enveloping closure on the interior contents when turned inside out, may be colored red, white, pastel blue, or transparent (depending on designated needs such as infectious wastes, regular safe disposal waste, etc.).
- 3) The paper toweling material may be substituted by cotton, linen, or a synthetic combination of fibers which has a high absorbency rate or similar quality.
- 4) The size of the clean-up device or bag may be expanded or enlarged for major surgical procedures where a great deal of fluids

are generated due to loss of blood and irrigation procedures. The gauze insert may also be enlarged and thickened (comparable to the thickness of a diaper) for various types of major surgeries requiring clean up and greater absorbency needs. The inserted gauze may also be enlarged appropriately or proportionally to meet the needs of any greater absorbency required in most major surgeries. Regular sizes may include: 11"X12", 11"X14", 10"X16" and 12"X20".

- 5) The clean up device may also be used with medicated gauze for medical emergency situations in emergency room and paramedic vehicles. Such a device may be used as a standard clean up device in trauma packs, operating room clean up kits, etc.
- 6) The bag of the invention may be used without the cut-resistant material in the case of using the pad 54 for special purpose hazardous waste clean up where sharp objects are not present, such as for scrubbing a hazardous waste and capturing the waste into the bag.
- 7) The bag may be used as an oil clean up bag for oil spill clean-ups on a garage floor or other contaminated surface. The pad 54 may be adapted to contain a solvent material to clean up the oil or the toweling may also be adapted to absorb oil.
- 8) A tack bag having a substrate on the insert and the towel exterior for clean up. This bag structure may be used to remove sediment & dust from an automobile exterior or similar finish that must be dust-free before an application of a finish coat or sealant is applied.
- 9) A bag with a "silver cloth" used to polish silver and other metals to a clean and bright finish.

- 10) "Treated" material bags with ammonia, soap, detergents, various cleaning products, etc., pretreated on the towel 52 or pad 54.
- 11) A sponge bag may be formed with a paper-thin sponge material on the outside for wiping spills off dining room tables and picking up garbage.
- 12) A Scotch Brite™ type bag may be formed by attaching Scotch Brite™ cleaning material on one side of bag for scouring.
- 13) A shoe shine bag may be formed similar to the type found in hotel rooms and having advertising printed on one side of the plastic, and the opposite side having a "buffing cloth material" for shoe polishing. The interior of the plastic lined bag may contain complimentary sample sized shoe polish, sewing kit, shampoos, soaps etc.

Of the various alternate embodiments outlined above, those that do not involve the cleaning up, in and around sharp objects may not require a cut-resistant layer in the bag design. In particular, items 7-13, listed above, would not normally require a bag construction with a cut-resistant material.

Although the present invention has been described with respect to specific embodiments and configurations, those skilled in the art will recognize that many modifications may be made thereto without departing from the spirit and scope of the claims appended hereto. As many changes are possible to the embodiments of this invention utilizing the teachings thereof, the descriptions above, and the accompanying drawings should be interpreted in the illustrative and not the limited sense.

THAT WHICH IS CLAIMED:

1. A clean up device comprising:

- a) a plastic bag having a top, a bottom and a first and a second side;
- b) a pad attached to an exterior surface of said plastic bag;
- c) a glove member attached to one interior side of said bag;
and
- d) a means for closing said bag, said means being located on the top of said bag.

5

2. The clean up device of Claim 1, wherein said glove member is comprised of an interior flexible sheet joined to one interior side of said bag and having seal lines defining a mitt area for receiving the hand of a user.

3. The clean up device of Claim 1, wherein a layer of cut-resistant material is provided to surround the exterior of said plastic bag, wherein said plastic bag and said glove are heat sealable and wherein said pad is comprised of a gauze pad.

4. . . The clean up device of Claim 1, wherein said closing means comprises two draw string cords.

5. The clean up device of Claim 1, wherein said closing means is comprised of an adhesive closing structure.

6. The clean up device of Claim 1, wherein said closing means is comprised of a cooperating channel and ridge style closing structure.

7. The clean up device of Claim 1, wherein said closing means is comprised of a structure having bendable rigid members positioned at the top of said bag.

8. The clean up device of Claim 1, wherein said closing means is comprised of a cuff for folding the top of said bag for closure, said cuff extending from the top of said bag.

9. The clean up device of Claim 1, wherein said closing means is comprised of a hook and loop closing structure.

10. The clean up device of Claim 1, wherein said closing means is comprised of opposing handle members constructed and arranged for tying to close said bag, said handle members extending from the top of said bag.

1/11

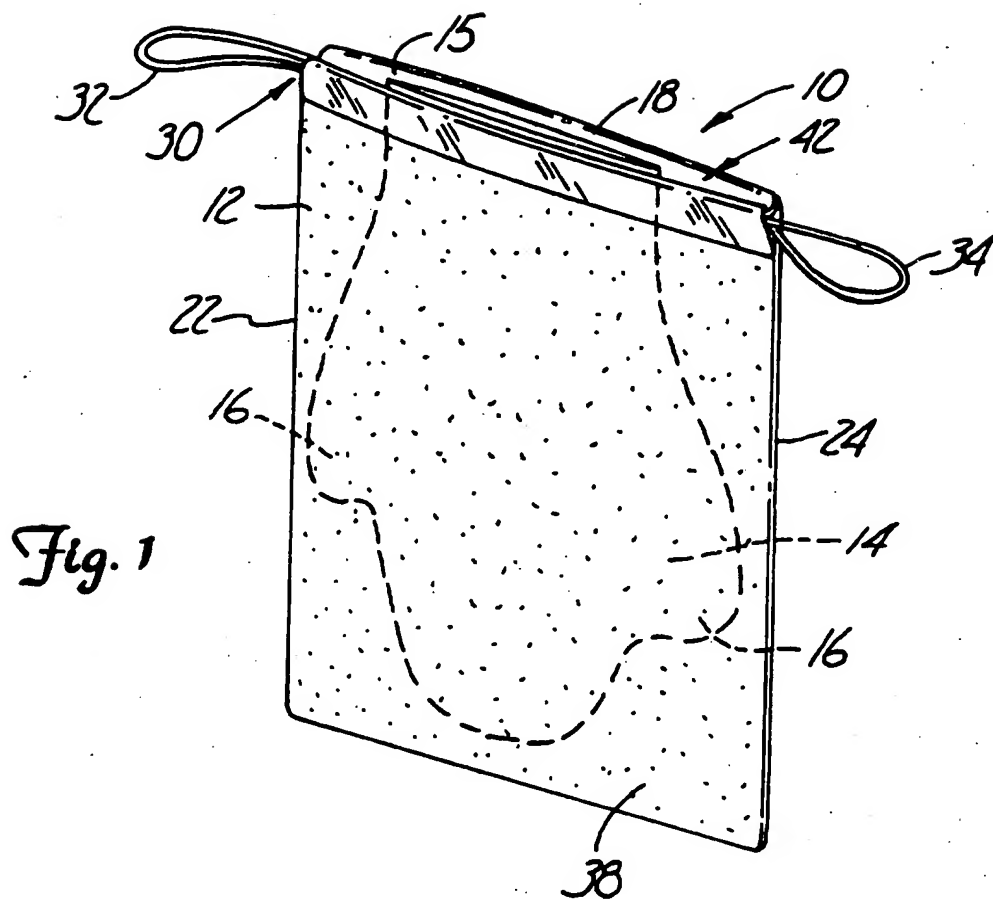


Fig. 1

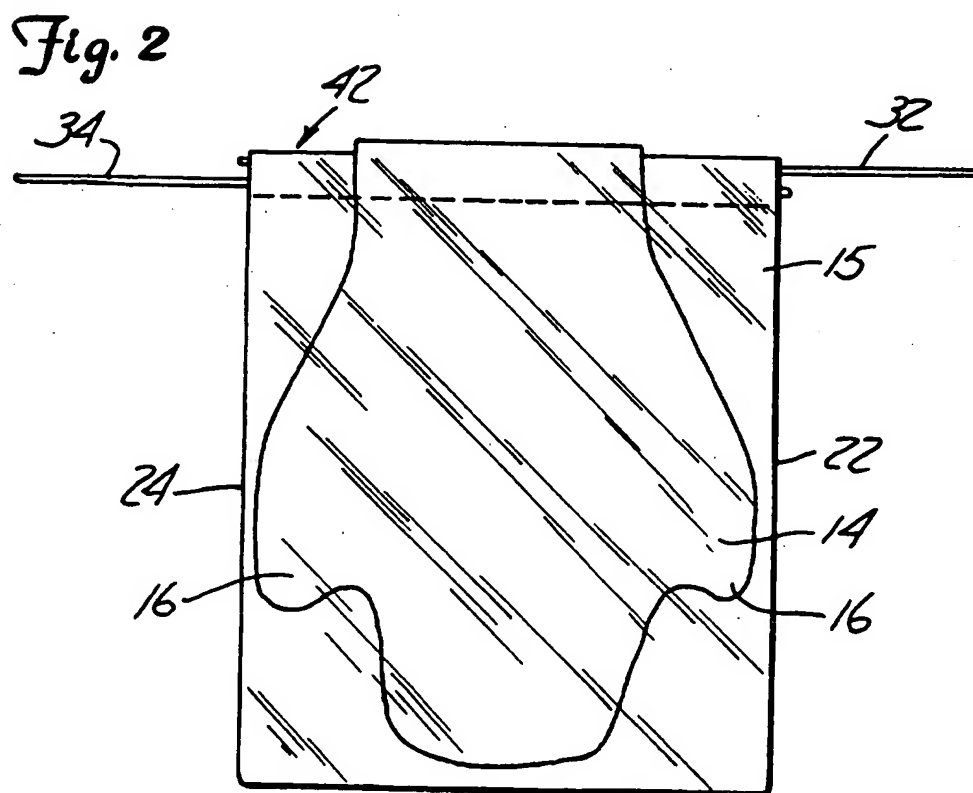


Fig. 2

2/11

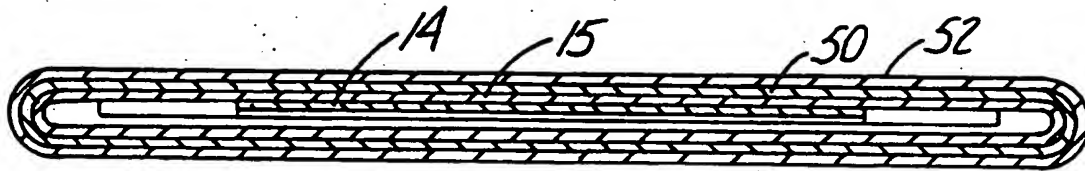


Fig. 3

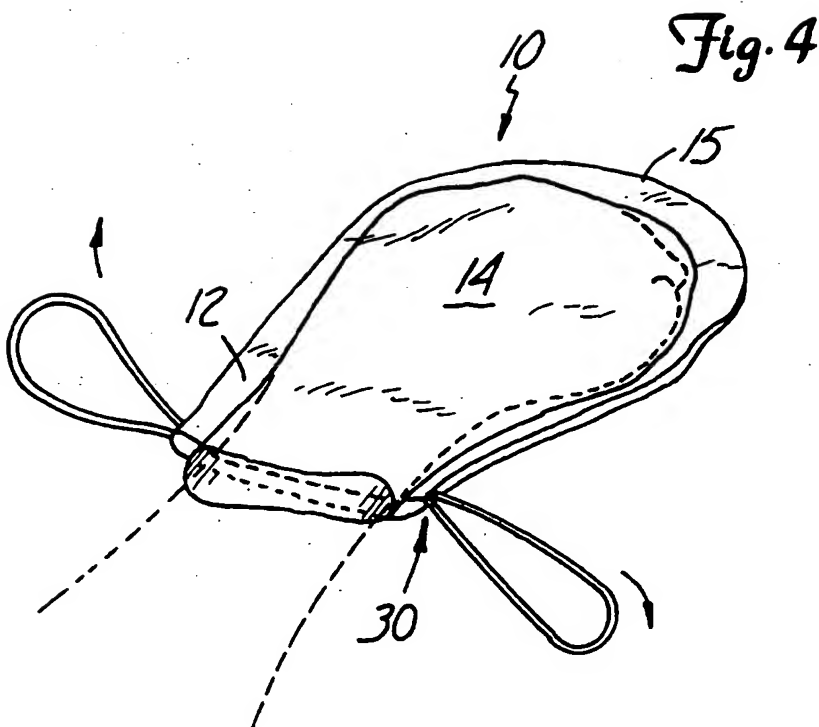


Fig. 4

3/11

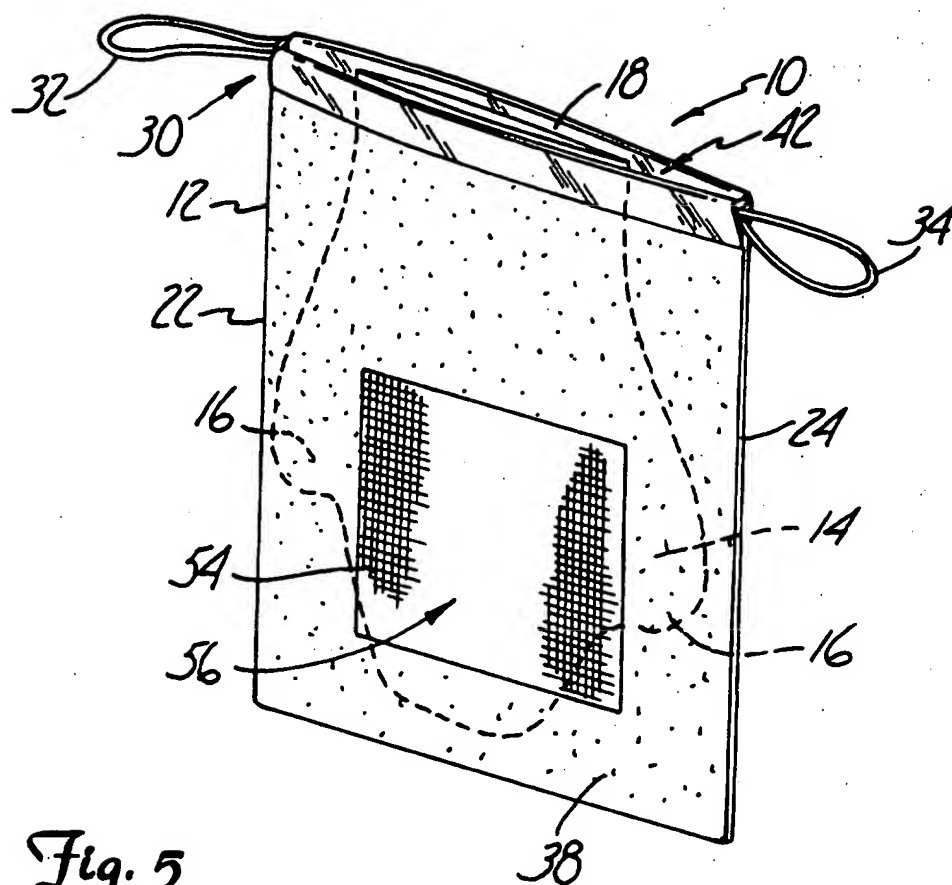
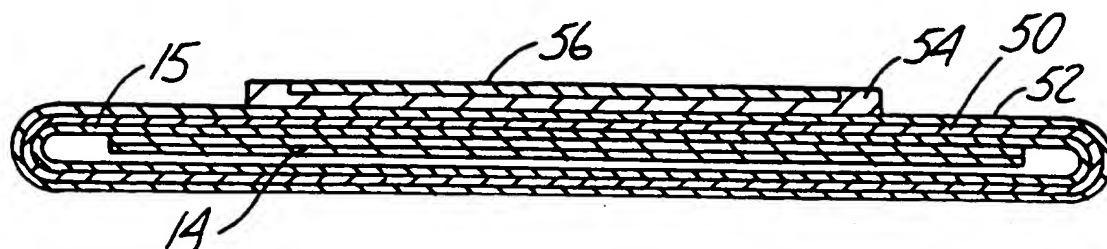


Fig. 5

Fig. 6



4/11

Fig. 7

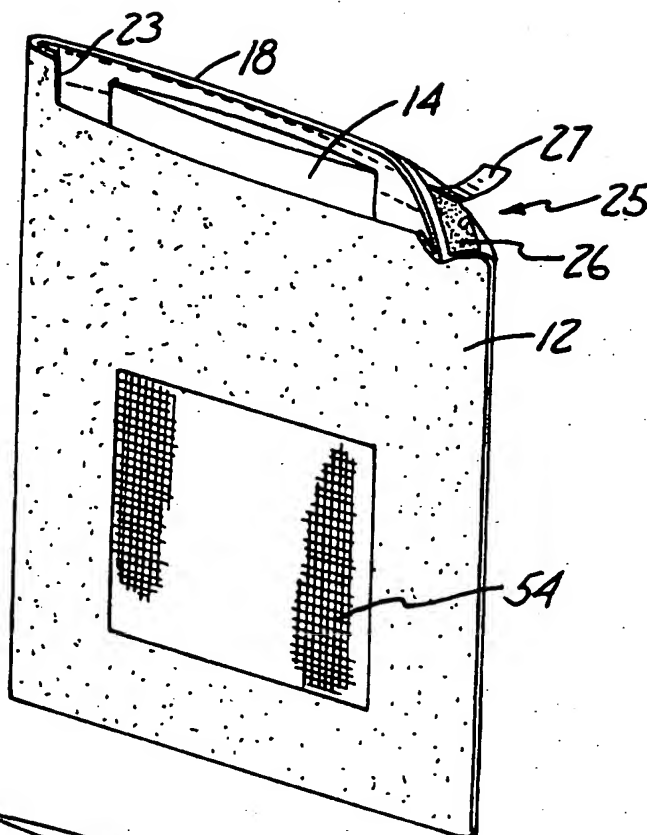
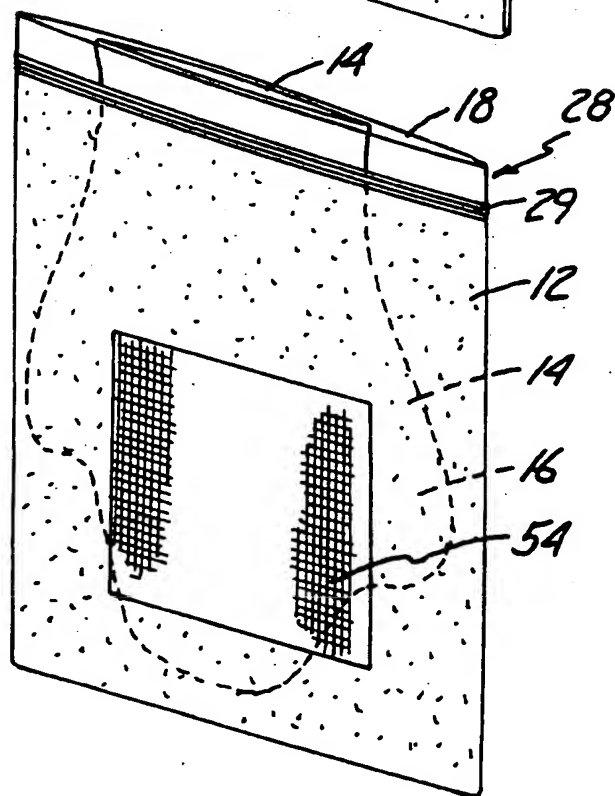
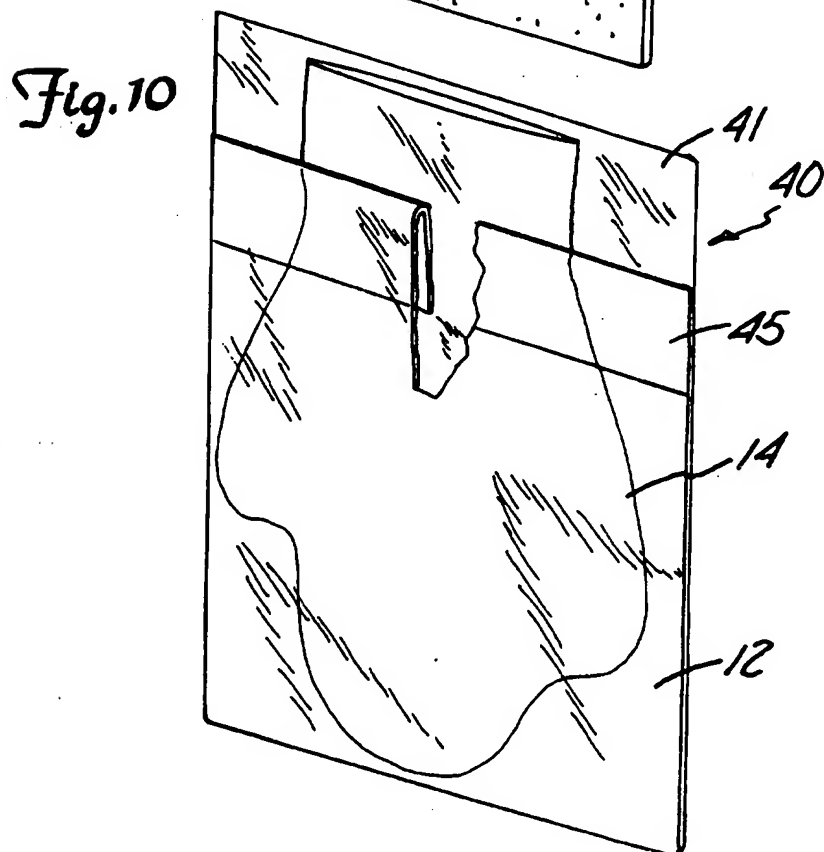
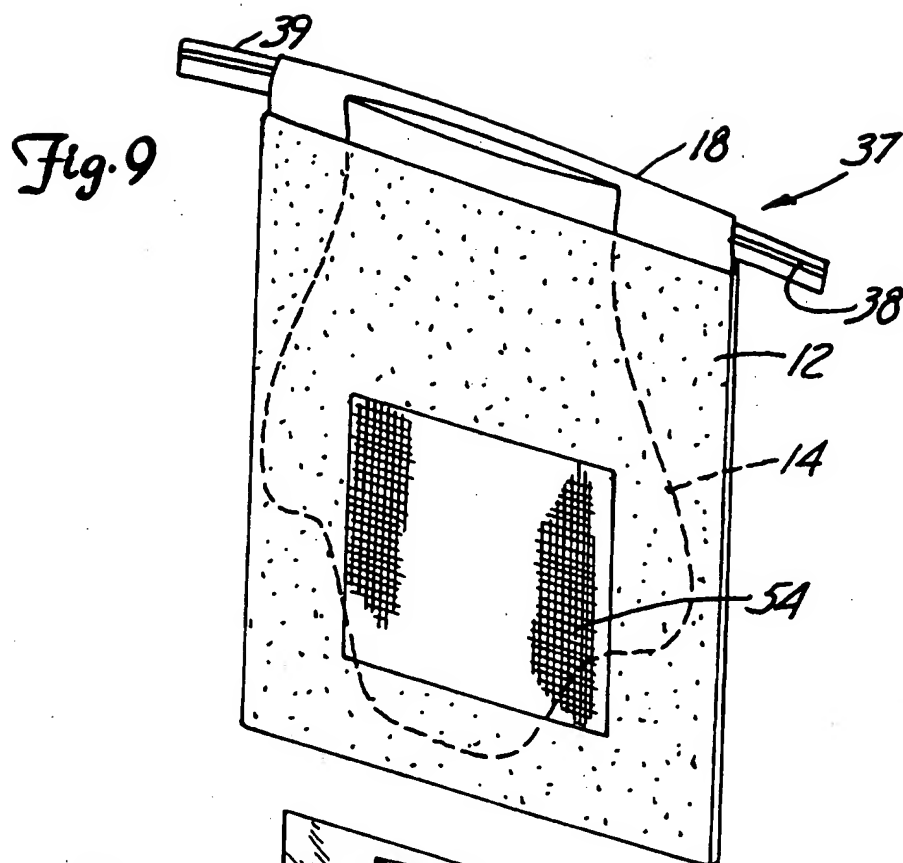


Fig. 8



5/11



6/11

Fig. 11

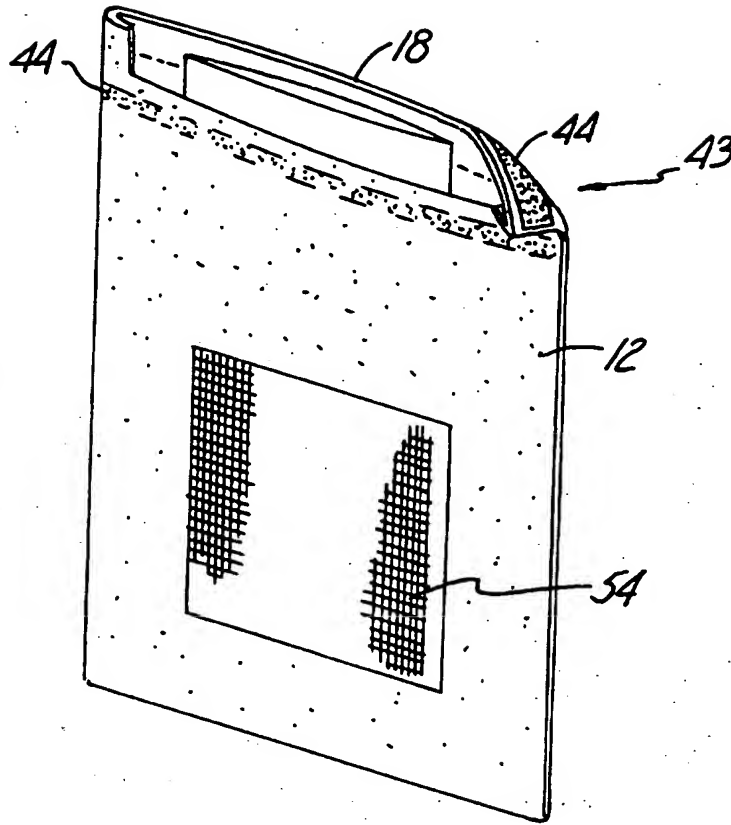
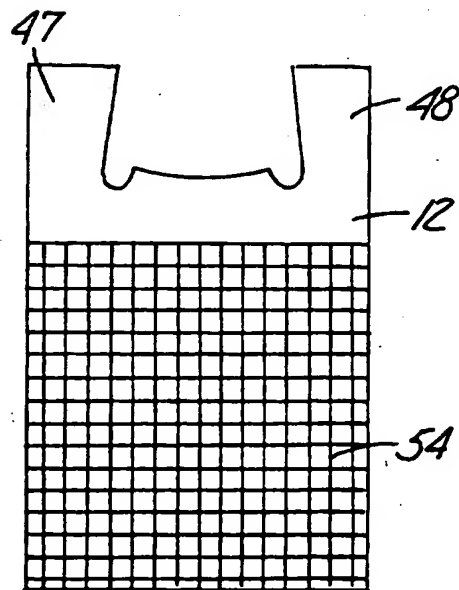


Fig. 12



7/11

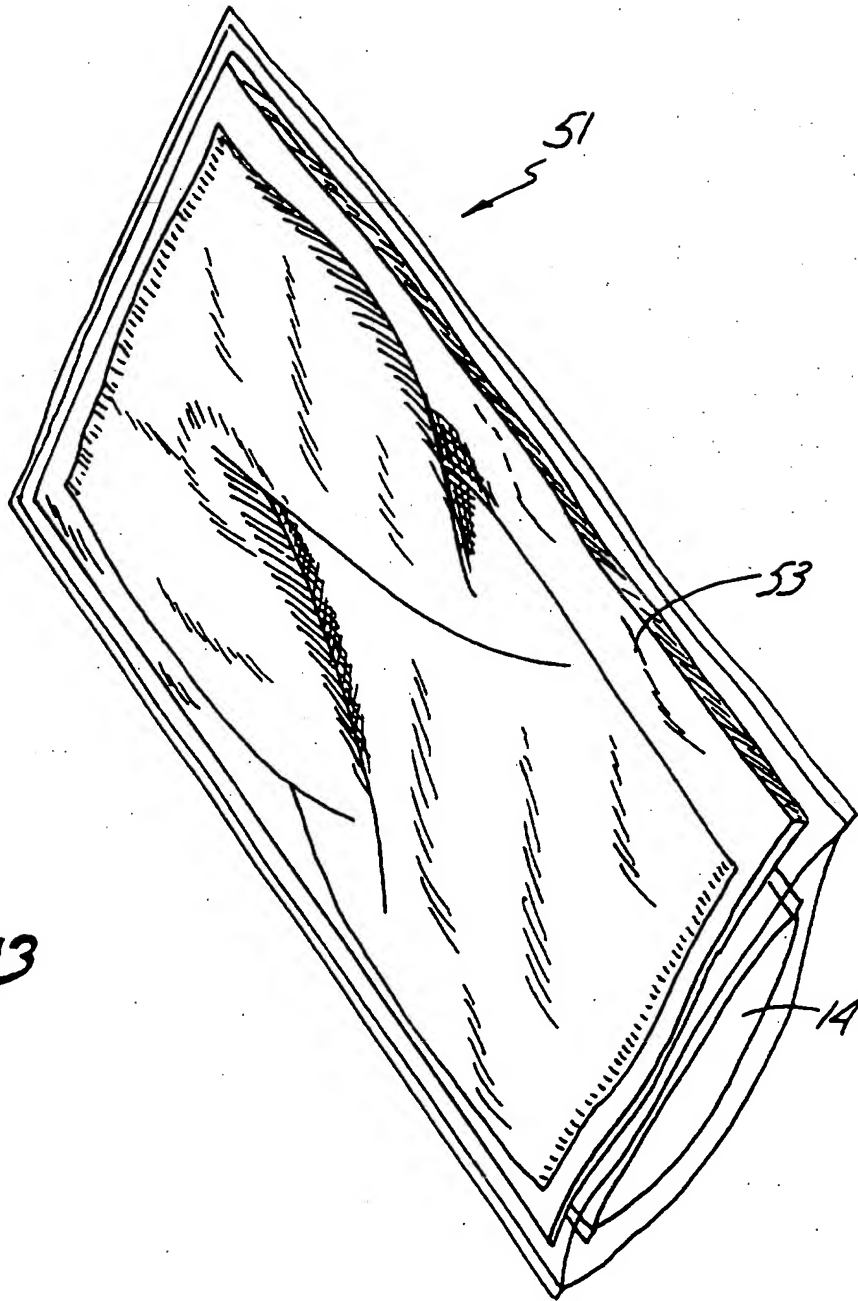


Fig. 13

8/11

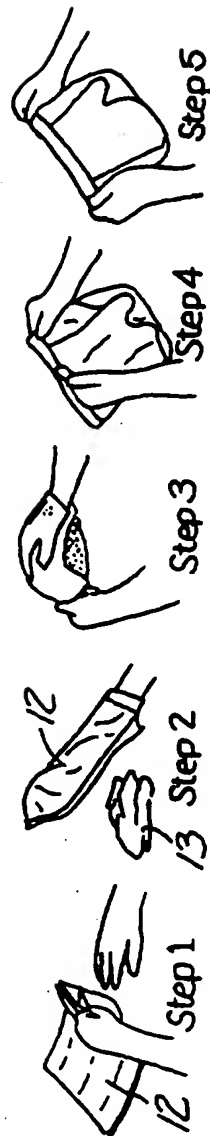


Fig. 14

9/11

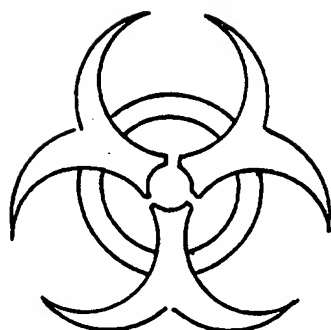
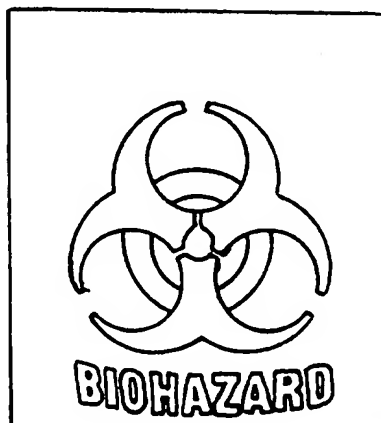


Fig. 15

55

INFECTIOUS
WASTE



57

Fig. 16

10/11

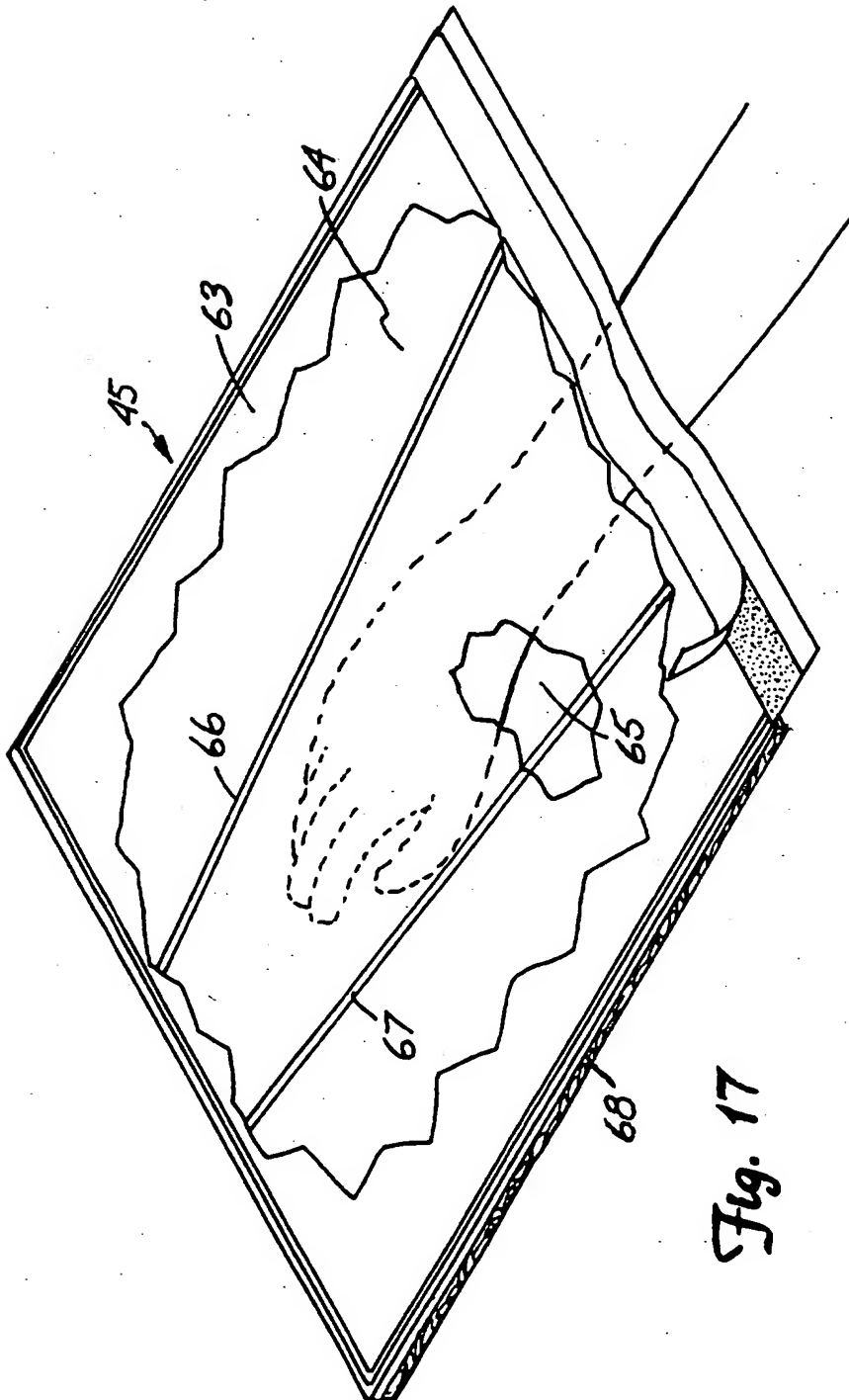


Fig. 17

11/11

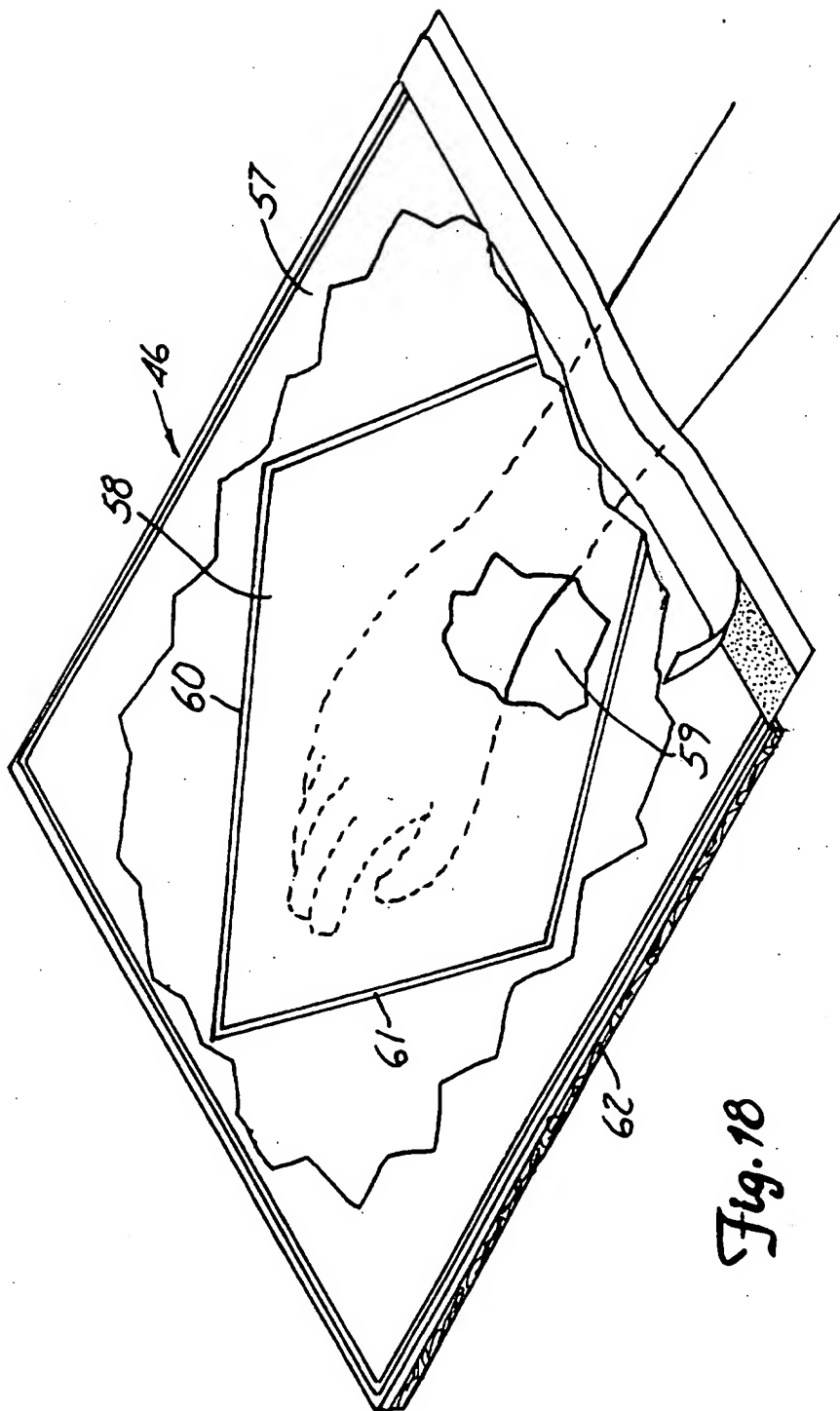


Fig. 18

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US95/13123

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :A47L 13/18

US CL :15/227; 2/158, 161.7; 161.8; 206/278, 438; 294/1.3

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 15/104.93, 104.94, 227; 2/158, 159, 160, 161.6-161.8, 162; 206/278, 438; 294/1.3

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
NONEElectronic data base consulted during the international search (name of data base and, where practicable, search terms used)
NONE**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X -- Y	US, A, 5,301,806 (OLSON) 12 April 1994, see entire document.	1,2,4 ----- 3,5-10
X -- Y	US, A, 4,964,188 (OLSON) 23 October 1990, see entire document.	1,2,4 ----- 5-10
Y	US, A, 4,902,283 (ROJKO ET AL) 20 February 1990, see column 4, lines 25 and 26.	3
Y	US, A, 4,677,697 (HAYES) 07 July 1987, see entire document.	6,9
Y	GB, A, 2,237,973 (CASTORINA) 22 May 1991, see page 7, lines 25-28.	5-10

☒ Further documents are listed in the continuation of Box C.
 ☐ See patent family annex.

* Special categories of cited documents:	T	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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O document referring to an oral disclosure, use, exhibition or other means		
P document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search

21 FEBRUARY 1996

Date of mailing of the international search report

13 MAR 1996

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US95/13123

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US, A, 2,795,806 (SUTTLES) 18 June 1957, see entire document.	1-10
A	US, A, 1,379,976 (GUTMANN) 31 May 1921, see entire document.	1-10

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